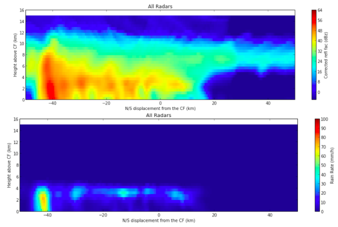
The Emergence of Open Source Software for the Weather Radar Community

Research Highlight

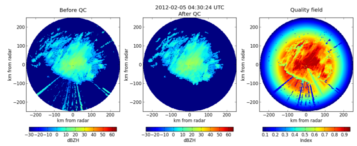
Since the emergence of weather radar technology in the 1940s, research has sought to tap the full potential of weather radar observations. During the digital age, improvements in radar technology have been closely linked to advancements in computer science and software engineering. Making use of modern radars is not possible without software. Open Source Software (OSS) is code that is freely available for use, reuse, and re-purposing. OSS enables living projects and, along with open data, enables reproducible science and maximizes the impact of the research on the scientific community.

OSS is key to leveraging massive and complex (big) datastreams from scanning and profiling radar and lidar systems. A natural ecosystem of interoperable codes can emerge by coordinating the efforts of the European community, BALTRAD (a radar network for the Baltic Sea Region), National Center for Atmospheric Research, National Aeronautics and Space Administration, and ARM through collaboration and the use of common data models and data formats. This article, the first of its kind, documents the capabilities and advancements of different OSS projects across the United States and Europe. As a joint effort of different groups, it prepares the ground for a new level of collaboration, towards a set of interoperable software codes available to the entire weather radar community.

The guiding principle of this cross-project collaboration will be interoperability, allowing not only for the platforms to exchange data, but also to exchange code (e.g., as shared libraries, code fragments, and open algorithms). Thus, this will speed up technological and scientific progress through cross-fertilization. In particular, this development will facilitate the transfer of mature algorithms from the research domain to operational applications. But while the standardization of algorithms is an important concern of the radar community, an awareness of the diversity of approach is an important aspect of this scientific endeavor. The final goal of these efforts are easy-to-use and easy-to-contribute tools for working with weather radars and lidars.



A slice through a three radar mesh map of radar reflectivity and rainfall rate produced using the Python-ARM Radar Toolkit (Py-ART), one of the projects highlighted in the recently accepted BAMS article. Using a common data model approach, Py-ART allows data fusion between multiple radars from multiple vendors and even agencies.



Maximum reflectivity data from a European radar, before quality control (left), after quality control and characterization using the BALTRAD toolbox (center), and a corresponding analysis of total data quality (right) based on methods contributed from Finland, Poland, and Sweden. These methods address probability of non-precipitation, beam blockage, attenuation from precipitation, and probability of overshooting, among other issues. Visualized by wradlib (wradlib.bitbucket.org/).

Reference(s)

Heistermann M, S Collis, MJ Dixon, SE Giangrande, JJ Helmus, B Kelley, J Koistinen, DB Michelson, P Markus, T Pfaff, and DB Wolff. 2014. "The Emergence of Open Source Software for the Weather Radar Community." Bulletin of the American Meteorological Society, , . ACCEPTED.

Contributors

Scott M. Collis, *Argonne National Laboratory*

Working Group(s)

Cloud Life Cycle, Cloud-Aerosol-Precipitation Interactions